KNOWLEDGE, ATTITUDE AND PRACTICE OF ANTIBIOTIC PRESCRIBING AMONG DOCTORS WORKING AT EMERGENCY DEPARTMENT HOSPITAL UNIVERSITI SAINS MALAYSIA

by

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LIST OF ABBREVIATIONS

ED	Emergency Department
HUSM	Hospital Universiti Sains Malaysia
MOH	Ministry Of Health
URTI	Upper Respiratory Tract Infection
WHO	World Health Organisation

ABSTRAK

KAJIAN MENGENAI PENGETAHUAN, SIKAP DAN PRAKTIS TENTANG ANTIBIOTIK PRESKRIBSI DI KALANGAN DOKTOR DI JABATAN KECEMASAN HOSPITAL UNIVERSITI SAINS MALAYSIA

Pengenalan

Antibiotik adalah ubat yang sering dipreskribsi di kalangan doktorr di jabatan kecemasan Hospital Universiti Sains Malaysia. Peningkatan masalah resistan antibiotik telah menjadi masalah global pada masa kini. Penggunaan antibiotik yang salah menjadi salah satu penyebab peningkatan prevalens resistan antibiotik. Adalah penting untuk menilai tahap pengetahuan, sikap dan praktis tentang antibiotik preskribsi di kalangan doktor di jabatan kecemasan Hospital University Sains Malaysia.

Objektif

Untuk objektif general adalah untuk menilai pengetahuan, sikap dan paraktis tentang antibiotic preskribsi di kalangan doktor di jabatan kecemasan Hospital Universiti Sains Malaysia. Untuk objektif spesifik adalah untuk menentukan tahap

pengetahuan, sikap dan paraktis tentang antibiotik preskribsi di kalangan doktor di jabatan kecemasan Hospital University Sains Malaysia dan juga untuk membandingkan purata skor pengetahuan di antara jawatan yang berbeza.

Kaedah

Kajian ini merupakan satu kajian rentas melibatkan doktor di jabatan kecemasan Hospital Universiti Sains Malaysia. Kajian ini dilakukan dari bulan Februari 2015 sehingga April 2015. Soalan yg perlu dijawap sendiri oleh responden telah diserahkan kepada semua doktor yang bersetuju untuk terlibat dalam kajian ini. Hanya soalan yang telah diisi sepenuhnya dianalisa dan soalan yang tidak lengkap tidak dikira dalam kajian ini.

Keputusan

Maklum balas telah diterima daripada 81 responden (83.3%) kadar maklum balas). Purata skor pengetahuan adalah 5.70 + 1.23. Untuk perbandingan skor pengetahuan di antara jawatan didapati tiada perbandingan yang ketara dengan F-stat (df) = 1.76, p = 0.179. Kebanyakan responden 69.1 (n = 56) sangat bersetuju antibiotik adalah masalah dunia, 24.7% (n= 20) sangat bersetuju antibiotik resistan adalah masalah national, manakala hanya 3.7% (n = 3) sangat bersetuju masalah antibiotik resistan adalah masalah dalam praktis mereka setiap hari. 61.7 % (n = 50) responden adalah yakin dengan pengetahuan mereka terhadap antibiotik. 58% (n = 47) responden melakukan preskribsi antibiotik lebih daripada sekali dalam sehari dan

kebanyakan responden 93.8% (n = 76) melakukan preskribsi antibiotik kepada pesakit yang didiscaj dan juga pesakit yang dimasukkan ke dalam hospital.

Kesimpulan

Kajian ini menunjukkan responden mempunyai skor pengetahuan yang sederhana dan tiada perbezaan ketara purata skor pengetahuan di kalangan jawatan yang berbeza.Responden sedar tentang masalah resistan antibiotik. Responden yakin terhadap pengetahuan mereka terhadap antibiotik dan kerap melakukan preskribsi antibiotik kepada pesakit.

ABSTRACT

KNOWLEDGE, ATTITUDE AND PRACTICE OF ANTIBIOTIC PRESCRIBING AMONG DOCTORS WORKING AT EMERGENCY DEPARTMENT HOSPITAL UNIVERSITI SAINS MALAYSIA

Introduction

Antibiotic is the medication frequently prescribed among doctors at Emergency Department. Currently upsurge of antibiotic resistance has become a global concern. Imprudent use of antibiotics is a fundamental factor for an upsurge in the prevalence of antibiotic resistance. It is important to assess knowledge, attitude and practice of antibiotic prescribing among doctors at emergency department to improve better antibiotic prescribing behaviour.

Objectives

For general objective to evaluate knowledge, attitude and practice of antibiotic prescribing among doctors at emergency department Hospital Universiti Sains Malaysia. For specific objectives to determine the level of knowledge, attitude and practice of antibiotic prescribing among doctors at emergency department

Hospital Universiti Sains Malaysia and to compare means score of knowledge among difference designation.

Methodology

This is a cross sectional study to assess knowledge, attitude and practice of antibiotic among doctors at emergency department Hospital Universiti Sains Malaysia. This study was done from February 2015 to April 2015 including all doctors who agreed to involve in this study. Self administrated questionnaire was distributed to all doctors who agreed for involved in this study. Only completed questionnaires were analyzed and incomplete questionnaire were excluded from this study

Results

Respond were received from 81 respondents (83.3%) response rate. Mean knowledge score was 5.70 $\pm$ 1.23. For comparison of knowledge score in between designation there was no significant different with F-stat (df) = 1.76 p = 0.179.Majority of respondents 69.1% (n = 56) strongly agree antibiotic resistance is worldwide problem, 24.7% (n = 20) strongly agree antibiotic is a national problem, only 3.7% (n = 3) strongly agree antibiotic resistance is problem in their practice.

61.7% (n = 50) respondents were confident of their knowledge on antibiotics. 58% (n = 47) prescribe antibiotic more than once daily and most of respondents 93.8% (n =76) prescribe antibiotic to both in and outpatient.

Conclusion

This study revealed that knowledge score of our respondent is moderate, there was no significant difference of knowledge in between designation. Respondents aware that antibiotic resistance is worldwide and national problem but only small proportion realized that it's problem in daily practice. Our respondent confident regarding knowledge of antibiotic and frequently prescribed antibiotic to patient.

CHAPTER 1 : INTRODUCTION

Antibiotics are effective in the treatment of infections because of the selective toxicity. Antibiotic have the ability to injure or kill invading microorganisms without harming the cell of the host (Harvey *et al.*, 2012).

Antibiotics are powerful medications that target microorganisms. They kill bacteria or stop their reproduction and thus are often used to treat infections caused by bacteria. Unlike many other drugs, for which prescribing is kept within a specialty (for example neuroleptic drugs), antibiotics are prescribed universally by all medical doctors and dentists in the community (Pulcini and Gyssens, 2013).

Emergence of antibiotic resistance has become a global public health concern. The World Health Organization (WHO) issued a Global Strategy for Containment of Antimicrobial Resistance in 2001 which urged member countries to initiate awareness and educational campaigns for patients and general community on appropriate use of antibiotics to combat antibiotic resistance (Organization, 2001). This was echoed by International Pharmaceutical Federation (FIP) in 2008 in its Statement of Policy on Control of Antimicrobial Drug Resistance and WHO Regional Office for South-East Asia in 2010 (Organization, 2010).

The indiscriminate and inappropriate use of antibiotics in outpatient clinics, hospitalized patients and in the food industry is the single largest factor leading to antibiotic resistance (Alanis, 2005).

WHO, along with partners across many sectors, is developing a global action plan to mitigate antibiotic resistance. Strengthening global antibiotic surveillance will be a critical aspect of such planning as it is the basis for informing global strategies, monitoring the effectiveness of public health interventions and detecting new trends and threats.

Despite frequently prescribed medication, knowledge for antibiotic prescribing generally is still not enough. One underlying factor for the emergence and spread of antibiotic resistance is the improper use of antibiotic, including practices related to antibiotic acquisition and disposal, and failure to comply with antibiotic therapy. Knowledge of antibiotic prescribing is a key for appropriate prescribers. Improper use of antibiotic for treatment of infection will cause failure to achieve beneficial effect and may lead to a worse prognosis. Imprudent use of antibiotics is a fundamental factor for an upsurge in the prevalence of antibiotic resistance (García *et al.*, 2011).

Antibiotics are extremely important weapon in the fight against infections. However, antimicrobial resistance is a growing problem. That is why an appropriate use of antibiotics is of great importance. A proper analysis of factors influencing appropriate antibiotic use is at the heart of an effective improvement programme, as

interventions can only result in improved medical behaviour if they are well attuned to the problems, the target group, and the setting in which the change is to take place. Determinants of appropriate and inappropriate prescribing are not only found in patient knowledge and behaviour, in the way medical professionals think and act, and in the way in which patient care is organised, but also in the wider, socio-cultural environment of doctors and their patients (Hulscher *et al.*, 2010b).

Appropriate antibiotic use in hospitals entails finding a middle road between their potent ability to reduce the mortality and morbidity of patients with infectious diseases and their potentially hazardous effects (ie, serious adverse events, drug interactions, and induction of resistant strains). Unnecessary use of antimicrobial agents, and use of the newest, broad-spectrum antibiotics when narrow-spectrum and older agents would suffice can lead to increases in resistance, harm patients, and increase treatment costs (Hulscher *et al.*, 2010a).

Doctors working at Emergency Department, frequently prescribed antibiotic to patient. The field of Emergency Medicine is relatively still new. Due to non-existence of proper academic activities regarding the emergency care systems, Malaysia was categorized as an underdeveloped emergency care systems ountry in 1999 (Arnold, 1999). However, things had changed since the first locally trained emergency phycisian graduated in 2002 and introduced into Malaysian Health services (Hisamuddin *et al.*, 2007). With the introduction of emergency phycisians, the emergency medical services in Malaysia has greatly improved.

With the expanding role of emergency department and the increasing demands for emergency health services, the influx of patients to emergencydDepartment may increase dramatically with various health conditions. The emergency department setting is distinct from the others department or primary care setting in many ways, having various illness, the need for rapid triage and treatment and limited previous and subsequent contact with patients.

In Malaysia, most of the studies about antibiotics were done among general public, primary care and in hospital among doctors in in-patients departments. No reported studies on anbiotic prescribing among doctors working at emergency department in Malaysia.

Doctors working in emergency department are usually the first team to treat patients either outpatient or in-patient. It is important to assess their knowledge, attitudes and practice about antibiotic prescribing. This study was design to assess the knowledge, attitude and practice about antibiotic prescribing among doctors working in Emergency Departments Hospital University Malaysia. Hopefully this study will give an overview status regarding the knowledge, attitude and practice antibiotic prescribing among doctors working in Emergency Departments Hospital University Malaysia.

CHAPTER 2 : LITERATURE REVIEW

2.1 Overview of Antibiotic

Antibiotic is one of the medications frequently prescribed by health care providers. The report of Malaysian Statistic on Medicine 2009/2010 shows that antibiotics ranked among top 10 most prescribed therapeutic agent in Malaysia. Among the drugs listed, Amoxycillin most widely used.

Antibiotic is a chemical substance produced by a *microorganism* that inhibits the growth of or kills other microorganisms. Antimicrobial agent is a chemical substance derived from a *biological source* or produced by *chemical synthesis* that kills or inhibits the growth of microorganisms. The two terms are usually used synonymously.

Antibiotics in strict sense are ‘‘natural chemical substances produced by microorganisms like bacteria and fungi that destroy or inhibit the growth of other microorganisms like bacteria and fungi’’ (according to the original definition by the Nobel laureate Selman Waksman). Antibiotics in broader sense ‘‘are selective antimicrobial agents other than disinfectants, antiseptics and substances used solely as antineoplastics, on application to living tissue or by systemic administration, they kill or prevent the growth of susceptible microorganisms and also include the synthetically or semi-synthetically antibacterial agents like sulfonamides and fluoroquinolones’’. Antibacterial agents are chemical substances that are either natural, semi-synthetic or synthetic that kills or inhibits the growth of bacterial

microorganisms. Antimicrobial drugs are chemical substances or drugs that kill or inhibit the growth of a variety of microorganisms like bacteria, viruses, fungi, and parasites (Bbosa and Mwebaza, 2013).

2.2 History of antibiotic

The first antimicrobial agent in world was Salvarsan, a remedy for syphilis that was synthesized by Ehrlich in 1910. In 1928, Fleming discovered Penicillin, he found that, in a culture studies, the growth of Staphylococcus aureus was inhibited in a zone surrounding a contaminated blue molds (a fungus from the Penicillin genus). The antibiotic was named Penicillin and it come into clinical use in the 1940s (Saga and Yamaguchi, 2009).

Improvements in each class of antimicrobial agents continued to achieve a broader antimicrobial spectrum and higher antimicrobial activity. The drugs have been developed to achieve better pharmacodynamics including the absorption of oral drugs, concentration in the blood, and distribution to the inflammatory focus. In addition, as antimicrobial chemotherapy has been established and matured, more importance has been attached to the drug safety. Antimicrobial agents that are associated with serious side effects have been replaced by other safer drugs.

In the 30 years following the introduction of sulfonamides and penicillin, scientists discovered and developed a wide range of antimicrobials to treat bacterial

diseases, presenting clinicians with a number of treatment options for most infectious diseases. The method of discovery of new agents was largely based on the methods of German and Swiss scientists from the late 19th century for evaluating naturally occurring compounds. Many new antimicrobials were discovered surreptitiously and by observation, such as the discovery of the original cephalosporin C-producing organism in sewer water. Many other antimicrobials were developed by chemical modification of existing agents (Powers, 2004).

2.3 Types of antibiotics

The clinically useful antibacterial drugs are organized into six families : penicillins, cephalosporins, tetracyclines, aminoglycosides, macrolides, fluoroquinolone and others, that is used to represent any drug not included in one of the other six drug families (Harvey *et al.*, 2012).

2.4 Classification of antibiotic

Antimicrobial drugs can be classified in a number of ways (Harvey *et al.*, 2012)

1) by their chemical structure (for example, β-lactams or aminoglycosides)

2) by their mechanism of action (for example, cell wall synthesis inhibitors)

3) by their activity against particular types of organisms (for example, bacteria, fungi, or viruses)

2.5 Antibiotic Resistance

Bacteria are considered resistant to an antibiotic if the maximal level of that antibiotic that can be tolerated by the host does not halt their growth. Some organisms are inherently resistant to an antibiotic. For example, most gram-negative organisms are inherently resistant to vancomycin. However, microbial species that are normally responsive to a particular drug may develop more virulent or resistant strains through spontaneous mutation or acquired resistance and selection. Some of these strains may even become resistant to more than one antibiotic (Harvey *et al.*, 2012).

Mechanism of antibiotic resistance divided into :

A. Genetic Alteration

B. Altered expression of proteins

A. Genetic alterations leading to drug resistance

Acquired antibiotic resistance requires the temporary or permanent gain or alteration of bacterial genetic information. Resistance develops due to the ability of DNA to undergo spontaneous mutation or to move from one organism to another.

B. Altered expression of proteins in drug-resistant organisms

Drug resistance may be mediated by a variety of mechanisms, such as a lack of or an alteration in an antibiotic target site, lowered penetrability of the drug due to decreased permeability, increased effl ux of the drug, or presence of antibiotic-inactivating enzymes.

Upsurge of antibiotic resistance become a global concern, infections with drug resistance organism remain an important problem in clinical practice and difficult to solve. The National Surveillance on Antibiotic Resistance (NSAR) Report Ministry of Health Malaysia 2014 reported that there was increase in the resistance rates to Erythromycin, Tetracycline and Trimethoprine/sulfamethoxazole among common strains of bacteria such as Streptococcus Pneumoniae.

There was global problem of antibiotic abuse and there was growing consensus to urgently develop new strategies for prevention of resistant of bacteria to antibiotic (Huang *et al.*, 2013). Growing resistance to antibiotics is a particularly serious global challenge and results largely from inappropriate prescribing and utilization of antibiotic (Sirijoti *et al.*, 2014).

Irrational use of antibiotic is a key reason for the increase and spread of antibiotic resistance. Several factors may enhance irrational antibiotics usage, which could be doctor's knowledge and experience, diagnostic uncertainty, patient's expectations, lack of patient and health care professional education, pharmaceutical

marketing, antibiotic selling without prescriptions as well as economic and political reasons (Suaifan *et al.*, 2012).

The irrational use, overuse or inadequate uses of antibiotics caused not only in the rise of resistant but also ineffective therapy, more adverse drug reactions, wasted resources, higher cost of therapy and ultimately more economic burden on national and global health system. Reduction in antimicrobial use is a cornerstone in the containment of antimicrobial resistance and can be addressed through changes in prescribing behaviour. Therefore, knowledge about the driving forces behind antimicrobial prescription is needed.

Increasing global concern antimicrobial resistance, shows a clear need for health care practitioners to be well tought about indication of antibiotic usage. The initiation of antibiotic use in the form of indiscriminative prescribing and dispensing has led to an upsurge in the resistance gene in commensal flora in hospitals, in communities and in the environment. Imprudent use of antbiotics is a fundamental factor for upsurge in the prevalence of antimicrobial resistance (Rajiah *et al.*).

The emergence of antibiotic resistance as a global problem underscores the need for physicians to be aware of its existence and factors that drives its development and it is important to better understand what physicians know about antimicrobial resistance and how they acquire and maintain that knowledge (Kheder, 2013).

(Abbo *et al.*, 2011) surveyed faculty and residents at Miami Florida to assess attitudes, perceptions, and knowledge about antimicrobial use and resistance. Most respondents were concerned about resistance when prescribing antibiotics and agreed that antibiotics are overused, that inappropriate use is professionally unethical, and that others, but not themselves, overprescribe antibiotics. Antimicrobial stewardship programs should capitalize on these perceptions.

Numerous studies at hospital and primary care revealed that prescribers have incorrect knowledge, wrong attitudes and inappropriate practice regarding antibiotic use. Local study in private and public health clinic in Malaysia, particularly in upper respiratory tract infection, concluded that high antibiotic prescribing rate in upper respiratory tract infection among private and public health clinic.

In Malaysia most of study regarding antibiotic was done at primary care, among general public and hospital. Previously published research from Malaysia reflected on the need for creating awareness among the general public and hospital doctors about the role of antibiotics in viral infections, in cough and cold symptoms and as well as compliance to antibiotic guidelines issued by Ministry of Health Malaysia.

A previous study on exploring antibiotic use and practices in a Malaysian community by Fatokun, 2014, examines the pattern of antibiotic use and practices

among individuals in a Malaysian community and identifies variables associated with the likelihood of non compliance to an antibiotic treatment course. Overall, most individuals obtain antibiotics through prescription. However, the non-completion of antibiotic treatment and the improper disposal of unused antibiotics need to be addressed to prevent resistance to antibiotic. In this study, male gender, lack of knowledge of antibiotic functions, and lack of awareness of antibiotic resistance were significantly associated with a greater likelihood of non-compliance with a full course of prescribed antibiotic treatment. Therefore, patient education and counselling about antibiotics and antibacterial resistance is very important to enhance compliance to antibiotic therapy (Fatokun, 2014).

Previuos study done at Sarawak District Hospital shows that there was an inaapropriately high rate of antibitic prescribing for upper respiratory tract infection in Sarawak District Hospital (Kho *et al.*, 2013).

A study among general practitioners in Malaysia showed that most general practioners in Malaysia had a moderate knowledge of antibiotic prescribing for URTIs. Furthermore, most general practitioners had positive attitudes towards antibiotic prescription. However there were concerns with actual prescribing behavior as well as the influence of patients on subsequent antibiotic prescribing. Consequently, educational interventions are needed among both physicians and patients to improve antibiotic prescribing among private general practitioners in Malaysia (Hassali *et al.*, 2015).

There was no reported published research about knowledge, attitude and practice about antibiotic prescribing among doctors at emergency department in Malaysia. Doctors who are working at emergency department, frequently prescribed antibiotic to the patient, including as outpatient and also inpatient. Excessive prescription of antibiotic has been documented in the emergency department setting (Karras *et al.*, 2003).

Previous study at Emergency Department San Francisco Hospital reveal that's, in many cases patients were administered antibiotics unnecessarily or were given antibiotics that were not active against the major pathogens causing their infectious disease. Several potential areas in which antibiotic use could be modified to minimize the use of unnecessary antibiotics and health care costs. Antibiotics were overused in patients who had pharyngitis,bronchitis and cutaneous abscesses (Siegel and Sande, 1983).

Another study done at United Stated shown that a multidimensional educational intervention targeting patients and clinicians in emergency department settings can reduce levels of antibiotic prescribing for patients diagnosed with upper respiratory tract infection and acute bronchitis (Metlay *et al.*, 2007).

Overuse of antibiotics for emergency department patients with colds, upper respiratory tract infection, and bronchitis is widespread, and additional studies are needed to determine why this occurs. In the meantime, there is enough information available to prompt action. Emergency Department clinicians and administrators

should begin to develop, test, and implement strategies to promote more judicious use of antibiotics (Stone *et al.*, 2000).

2.6 Knowledge About Antibiotic Prescribing

Increasingly numbers of antibiotic resistance posing threats to human health and life. Doctors working in emergency department are front liner, working both in pre hospital and as well as in hospital settings. In order to contribute to save lives and promoting health under such difficult situations, they need to have the right competencies.

One local study, in public health care facilities in the state of Kedah, shows that knowledge on antibiotic was moderated among medical officers (Tan *et al.*, 2015b). In that study, assessments were done among medical officer of public health care facilities. Mean knowledge score on antibiotic was 5.31 $\pm$ 1.19. The highest score by their respondents was 7 over 8 knowledge questions.

In another study done at Lima, Peru revealed that respondents at hospital in Lima, Peru had theoretically knowledge about antibiotic ranged from very good to excellent. The mean knowledge score was 6.0 $\pm$ 1.3. The highest score by their respondents was 6 over 7 knowledge questions(García *et al.*, 2011).

Study by Srinivasan et al., 2004 also reveals that survey at Johns Hopkins Hospital, reported that their respondents had suboptimal knowledge about antibiotic. In that study, mean knowledge score was 28% (Srinivasan *et al.*, 2004).

Another study regarding general practitioners' knowledge, attitude and prescribing of antibiotics for upper respiratory tract infections in Selangor, Malaysia showed that most general practioners in Malaysia had a moderate knowledge of antibiotic prescribing for URTIs. The respondents in that study shows that, 45.3% (n=63) had a moderate level of knowledge with score of 3-4. Thirty-six per cent (n=50) respondents were considered to have good knowledge and 18.7% (n=26) were categorized as having poor knowledge (Hassali *et al.*, 2015).

The prescribing behaviour of medical doctors plays a key role in the consumption of antibiotic and is a potential tool for control antibiotic resistance. Inappropriate prescribing of antibiotic and poor knowledge about antibiotic usage causes the increase of antibiotic resistance. Knowledge is the first step in modifying behaviour in relation to physicians' adherence to clinical practice and behaviour change based on influencing knowledge and attitude is probably most sustainable than indirect manipulation of behaviour alone.

A study at Saudi Arabia, most (92.0%) their participants believed that inappropriate use of antimicrobial agents may result in antimicrobial resistance, and almost half (103, 48.6%) of the respondents believed that inadequate knowledge is the most important contributor to poor antimicrobial practices (Baadani *et al.*, 2015). It is crucial to address the irrational prescribing of antibiotics as this can enhance

resistance development. Inadequate knowledge regarding resistance patterns in local settings might also contribute to this. Consequently, understanding physicians' views and their knowledge regarding antibiotic resistance is essential to plan measures to address prescribing concerns (Hassali *et al.*, 2015).

2.7 Attitude About Antibiotic Prescribing

The problem antibiotic resistance is accelerated by their abundant use and misuse by humans in the form of irregular and inappropriate treatment by health care workers as well as selfmedication by the patients. Furthermore, lacking of the proper legal frameworks that support quality and appropriate use of antimicrobials and implementing poor managerial mechanisms for proper selection, procurement, distribution, and use of these valuable medicines.

A physician's knowledge might influence antibiotic use; a lack of familiarity with or awareness of available evidence or consensus on appropriate antibiotic use might negatively affect individual prescribing behaviour. Physicians might not know enough about infectious diseases, the potential causative microorganisms, their susceptibility to antimicrobial agents, or antimicrobial drugs (Hulscher *et al.*, 2010a).

Regarding confidence level of antibiotic prescribing, study among medical officer at public health clinic in Kedah by concluded that 4.0% of the respondents were very confident in choosing the right antibiotic (Tan *et al.*, 2015b). Another study compare the confident level between junior doctors at 2 different hospital in

Nice (France) and Dundee (Scotland) shows that junior doctor feel relatively confident when prescribing an antibiotic, with Dundee junior doctors being more confident than Nice junior doctors (Pulcini *et al.*, 2011).

Study by (Thriemer *et al.*, 2013) at Congo shows that, no significant correlation between confidence and mean knowledge score.

Antibiotic resistance continued to be a major public health problem throughout the world. However, it is more serious in developing countries due to antibiotic use without medical guidance and inadequate regulation of antibiotics.

2.8 Practice About Antbiotic Prescribing

Proper prescribing pattern among prescribers are important for good antibiotic using. Rational dosing of antimicrobial agents is based on their pharmacodynamics (the relationship of drug concentrations to antimicrobial effects) and pharmacokinetic properties (the absorption, distribution, metabolism and elimination of the drug by the body). Utilizing these properties to optimize antibiotic dosing regimens can improve clinical outcomes and possibly decrease the development of resistance.

(Srinivasan *et al.*, 2004) study revealed s that emergency medicine house staff prescribing antimicrobials significantly more frequent that others speciality. The pattern of antibiotic usage in six general hospitals in Malaysia shows that about two

thirds were prescribed for therapeutic purposes and the most common infections treated were lower respiratory tract infections. However, there was a lack of compliance with antibiotics guidelines issued by the Ministry of Health (Oh *et al.*, 2010).

A number of organisations have drawn up guidelines that describe in precise detail the part antibiotics should play in specific health problems. Thereare, however, many indications that these guidelines are not being followed closely enough and that as a consequence the resistance problem is becoming even more acute (Hulscher *et al.*, 2010b).

The monitoring of antibiotic use is another important strategy. In many countries national antibiotic utilization studies are conducted regularly. It has been shown that countries that have high antibiotic consumption rates also have high levels of resistance. To improve prescribing practices, national antibiotic use guidelines and national formularies may be established. The professional societies can also issue evidence-based clinical practice guidelines for the more commonly encountered infections (Lim, 2003).

There are considerable unmet training and education need for physicians in the area of antimicrobial prescribing. Local antimicrobial guidelines need revision to ensure they are more relevant and helpful for medical practitioners (Baadani *et al.*, 2015).

A survey at United Sated, educational programs are important to promote judicious antibiotic use and prevent antibiotic resistance. Many interventions have components for both physician and public education. Results from that survey and others emphasize the importance of a multifaceted public education campaign. Although research is currently ongoing to determine the most effective methods for public education campaigns, the findings in this study indicate that the content should include information addressing misconceptions regarding the utility of antibiotics for treating “bronchitis” and purulent rhinitis, both of which are common diagnoses in adults and children (Belongia *et al.*, 2002).

CHAPTER 3 : OBJECTIVES

3.1 General Objective

To evaluate the level of knowledge, awareness and practice on antibiotic prescribing among doctors working in Emergency Department Hospital University Sains Malaysia.

3.2 Specific Ojectives

- To determine the level of knowledge, awareness and practice on antibiotic prescribing among doctors working in Emergency Department Hospital Universiti Sains Malaysia.
- To compare mean scores of knowledge among different designation.

CHAPTER 4 : METHODOLOGY

4.1 Research Questions

- What are the levels of knowledge, awareness and practice of antibiotic prescribing among doctors working in emergency department Hospital Universiti Sains Malaysia.
- What are the means scores of knowledge of antibiotic prescribing among doctors working in Emergency Department Hospital Universiti Sains Malaysia.

4.2 Study design:

This study was a cross-sectional study. The primary end points of the study were to determine the levels of knowledge, attitude and practice of antibiotic prescribing among doctors working in emergency department Hospital Universiti Sains Malaysia.

4.3 Study Approval

This study was conducted in emergency department Hospital Universiti Sains Malaysia. Ethical approval was granted from Human Research Ethics Committee University Science Malaysia (USM) in January 2015. (Appendix A)

4.4 Study duration

This study was done for a period of 3 months from February 2015 to April 2015.

4.5 Study location

This study was conducted at Emergency Department Hospital University Sains Malaysia, which is a tertiary and a teaching hospital in Kelantan.

4.6 Study sample:

The reference population was all doctors working at Emergency department in Hospital University Sains Malaysia will be included in the study.

4.7 Inclusion and exclusion criteria

4.7.1 Inclusion criteria:

All doctors working in Emergency Department Hospital University Sains Malaysia at the time of study.

4.7.2 Exclusion criteria:

Doctors who refused to be involve in this study and incomplete questionnaires were excluded from the study.

4.8 Research Tools

A set of questionnaire was used in this study. The validated questionnaire adapted from previous study was used. The original questionnaire was adapted from study done at Lima, Peru by Garcia et al. and Congo by Thrimer et al. The questionnaire was validated to be used in Malaysia by study among medical officer of public health facilities in the state of Kedah by (Tan *et al.*, 2015a). The questionnaire was revised by three expert panels (Emergency physician, statistician and microbiologist) for contents and reability to be used in Hospital University Sains Malaysia.

The questionnaire was divided into 4 section; subject variables, knowledge, attitudes and practice.

1) Subjects Variables
2) Knowledge
    a. Knowledge was assessed in total of eight questions, divided into three case presentations and five questions about antibiotic properties. Each true answer will get one score, total knowledge score was eight.
    b. Original questionnaire had two additional knowledge questions addressing the respondents estimation of local resistance rate which were was not included in this questionnaire. It was not included in overall knowledge score.

3) Attitude
    a. Attitude secion was subdivided into 4 section to assess
        i. Awareness of antibiotic resistance
        ii. Awareness of factor influencing antibiotic resistance
        iii. Confidence and seeking input
        iv. Acceptability of potential intervention
4) Practice
    a. Practice section was subdivided into 3 section to assess
        i. Frequency of antibiotic prescription
        ii. Education about antibiotic and source of in formation
        iii. Factors influencing prescription

4.9 Sampling method

No specific sampling method of calculation was employed as all subjects who fulfill the inclusion and exclusion criteria during the study duration will be included in the study. Convenient sampling was applied for this study.

4.10 Sample Size Calculation

All doctors working in emergency department Hospital Universiti Sains Malaysia was selected based on previous study. Convenient sampling was applied.